

# Melissa Breeden

Research Scientist  
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NOAA Physical Sciences Laboratory

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Boulder, CO 80305

## Education

**University of Wisconsin-Madison**, Atmospheric & Oceanic Sciences

Advisor: Professor Jonathan Martin

*Dissertation:* Diagnosing Initiation of North Pacific Jet Retractions using Piecewise  
Tendency Diagnosis and a Linear Inverse Model

**Ph.D.**

2013-2018

**University of Wisconsin-Madison**, Atmospheric & Oceanic Sciences

Advisor: Professor Galen McKinley

*Thesis:* Climate Impacts on Multidecadal North Atlantic pCO<sub>2</sub> Variability: 1948-2005

**B.S.**

2009-2013

## Research Experience

**NOAA Climate and Global Change Postdoctoral Fellow**, NOAA Earth System Research  
Laboratory, Chemical Sciences Division

08/2019 –  
12/2020

**Postdoctoral Research Associate**, University of Wisconsin-Madison Space Science and  
Engineering Center

05/2018 –  
07/2019

**Research Assistant**, University of Wisconsin-Madison  
Department of Atmospheric & Oceanic Sciences

06/2013 –  
05/2018

**NSF Research Experience for Undergraduates Recipient**, Oregon State University College of  
Earth, Ocean and Atmospheric Sciences

06/2012 -  
08/2012

## Publications

Albers, J. R., A. H. Butler, **M. L. Breeden**, A. O. Langford, G. N. Kiladis: Subseasonal prediction of  
springtime Pacific-North American transport using upper-level wind forecasts, submitted to *Weather and  
Climate Dynamics*.

**Breeden, M. L.**, A. H. Butler, J. R. Albers, M. Sprenger and A. O. Langford: The Spring Transition of the  
North Pacific Jet and its Relation to Deep Stratosphere-to-Troposphere Mass Transport over Western North  
America, accepted by *Atmospheric Chemistry and Physics*.

**Breeden, M. L.**, R. Clare, J. E. Martin, and A. R. Desai, 2020: Diagnosing the Influence of a Receding Snow  
Boundary on Simulated Midlatitude Cyclones Using Piecewise Potential Vorticity Inversion. *Mon. Wea.  
Rev.*, **148**, 4479–4495, <https://doi.org/10.1175/MWR-D-20-0056.1>.

**Breeden, M. L.,** B. T. Hoover, M. Newman, and D. J. Vimont, 2020: Optimal North Pacific Blocking Precursors and Their Deterministic Subseasonal Evolution during Boreal Winter. *Mon. Wea. Rev.*, **148**, 739–761, <https://doi.org/10.1175/MWR-D-19-0273.1>.

**Breeden, M. L.** & J. E. Martin, 2019: Evidence for Nonlinear Processes in fostering a North Pacific Jet Retraction, *Quart. J. Roy. Meteor. Soc.*, **145**, 1559-1570. doi:10.1002/qj.3512.

**Breeden, M. L.** & J. E. Martin, 2018: Analysis of the onset of an extreme North Pacific Jet Retraction using Piecewise Tendency Diagnosis, *Quart. J. Roy. Meteor. Soc.*, **144**, 1895-1913. doi: 10.1002/qj.3388.

**Breeden, M. L.** & G. A. McKinley, 2016: Climate Impacts on Multidecadal North Atlantic pCO<sub>2</sub> Variability: 1948-2009. *Biogeosciences*, **13**, 3387-3396. doi:10.5194/bg-13-3387-2016.

## Outreach and Service

- Member of the NOAA PSL Seminar Committee 2021 – Present
- Member of the Blocking Workshop Science Committee 2021 – Present
- Member of the AGU Atmospheric Science Early Career Committee, 2019 – Present
- Member of the Cyclone Workshop Science Committee, 2018 – 2020
- Local Manager, University of Wisconsin-Madison, WxChallenge National Weather Forecasting Competition, 2015-2017.

## Professional Awards and Activities

- \* Waves to Weather travel award to attend the Cyclone Workshop, 2019
- \* Member of the UW-Madison Postdoctoral Research Symposium Committee, 2018
- \* Member of Graduate Student Association Welcome, Colloquium, & Graduation Committees, 2014-2018
- \* Bias Training Workshop, Department of Educational Sciences, UW-Madison, February 2017
- \* Colloquium Student Service Award, Department of Atmospheric & Oceanic Sciences, April 2016
- \* Third Place Poster Presentation, 28<sup>th</sup> Conference on Climate Variability and Change, AMS Annual Meeting, January 2016
- \* Best Student Presentation, 18<sup>th</sup> Conference on Middle Atmosphere, AMS Annual Meeting, January 2015
- \* Department Travel Award to attend AMS Annual Meeting: 2014-2017
- \* Member of the American Meteorological Society, American Geophysical Union and American Physical Society

## Presentations

Invited: NC State

CSU ML talk

Breeden, M., B. T. Hoover, M. Newman, and D. J. Vimont: Diagnosing North Pacific Blocking using a Linear Inverse Model, American Geophysical Union Fall Meeting, San Francisco, CA, December 2019.

Breeden M., and J. E. Martin: The role of nonlinear processes in fostering a North Pacific jet retraction, Cyclone Workshop, Seon, Germany, October 2019.

Invited presentation: Breeden M., J. E. Martin, B. T. Hoover, M. Newman and D. J. Vimont: North Pacific Blocking: Introduction to Dynamical Mechanisms and Contributions from Tropical and Extratropical Forcing. State College of New York Albany Department of Atmospheric and Earth Sciences, Albany, NY, March 2019.

Breeden, M., B. T. Hoover and M. Newman, 2019 (oral): Diagnosing North Pacific Blocking using a Linear Inverse Model. American Meteorological Society Annual Meeting, Phoenix, AZ, January 2019.

Invited presentation: Breeden M., North Pacific Jet Retractions: Introduction to Dynamical Mechanisms. San José State University Department of Meteorology and Climate Science, San José, CA, December 2018.

Breeden, M., 2018 (oral): Lessons Learned from the Earth Science Women's Network Leadership Workshop. Department of Atmospheric and Oceanic Sciences Seminar Series, University of Wisconsin-Madison, Madison, WI, November 2018.

Invited Presentation: Breeden M., J. E. Martin, B. T. Hoover, M. Newman, and D. Vimont, 2018 (oral): North Pacific Jet Retractions: Dynamic Mechanisms and Contributions from Midlatitude and Tropical Forcing. Physical Sciences Division, National Oceanic and Atmospheric Administration-Earth Science Research Laboratory, Boulder, CO, October 2018.

Breeden M. and J. E. Martin, 2018 (oral, Ph.D. Defense): Diagnosing the onset of North Pacific Jet Retractions using Piecewise Tendency Diagnosis and a Linear Inverse Model. Department of Atmospheric and Oceanic Sciences Colloquium Series, University of Wisconsin-Madison, Madison WI, April 2018.

Breeden M., and J. E. Martin, 2018 (oral): Comparing North Pacific Wintertime Blocking and Jet Retractions: Identification, Structure, and Mechanisms. American Meteorological Society Annual Meeting, Austin, TX, January 2018.

Lecture: Midlatitude Cyclones and Cyclogenesis, Introduction to Weather and Climate (AOS 100), Department of Atmospheric and Oceanic Sciences, University of Wisconsin-Madison, October 2017.

Breeden M., and J. E. Martin, 2017 (oral): Diagnosing the Lifecycle of an LC1- Breaking Wave using Piecewise Tendency Diagnosis. Cyclone Workshop, Sainte-Adele, Quebec, CA, October 2017.

Invited Lecture: Introduction to North Pacific Jet Variability and Blocking. Geosciences Department, Northern Illinois University, April 2017.

Breeden M., and J. E. Martin, 2016 (oral): Onset of a Dipole-Type Block in the Wintertime North Pacific. Workshop on Atmospheric Blocking, Department of Meteorology, University of Reading, Reading, UK, April 2016.

Breeden, M & Martin, J.E., 2015 (oral): Case Study of a Cold-Season Jet Retraction Event. American Meteorological Society Annual Meeting. Phoenix, AZ, USA, January 2015.

Breeden, M. & McKinley, G.A., 2014 (oral): Impacts of Climate Variability on North Atlantic pCO<sub>2</sub>: Modeled for 1948-2005. Ocean Sciences Meeting. Honolulu, HI, USA, February 2014.